# CHAPTER 2

# GRAIN TEST SCALES

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# GRAIN TEST SCALES

## 1. INTRODUCTION

a. General. Scales[1] are an integral part of any well equipped laboratory and are essential tools for all grain, rice, and commodity inspections. For official purposes, only use scales that are:

(1) Presently approved; or

(2) Class II or III scales that have been evaluated by FGIS or a National Type Evaluation Program (NTEP) authorized laboratory and approved by NTEP as meeting commercial and FGIS criteria;

(3) Maintained in good operating condition; and

(4) Examined and tested at the prescribed intervals, in the proper manner, and found to be within tolerance.

b. Categories. A scale is either marked or unmarked, not both. Test each scale according to the procedures and tolerances for the category.

(1) *Marked*. New scales are approved based on NTEP and FGIS criteria by Class; for example, Class II or II.

(2) *Unmarked*. Prior to 1986, grain test scales were categorized by type of use; i.e., precision, moisture, and general. FGIS approved scales based

1 The term "scale," as used throughout this chapter, means either a scale or balance-type weighing device, used for weighing portions used to determine factor percentages (such as dockage), test weight per bushel, moisture portions, and other associated factors. Scales used for chemical determinations shall comply with requirements established by the Technical Services Division.

on division size, accuracy, and capacity. These scales remain approved.

## 2. INSPECTION

Before testing, inspect the scale for the following elements:

a. Zero Load Balance as Found. A scale shall be maintained so that with no load (except a tared scoop or pan) on the receiving element, the scale shall maintain a zero balance condition.

b. Support. Check the table or desk on which the scale is used. If it is not stable, or causes vibration, fix the table or move the scale.

c. Level Condition. A scale equipped with a level-condition indicator shall be maintained in level. Examine and adjust the scale so that it is level front-to-back and side-to-side and indicates a zero balance.

d. Maintenance, Use, and Environmental Factors.

(1) Scales must be maintained in good operating condition. Examine and adjust scales prior to initial use and periodically thereafter, as needed. Keep scales clean and repair or replace loose, broken, and missing parts.

(2) Counterbalance weights must be Class F weights that have a current Report of Test. Weights must be retested by FGIS or a State metrology laboratory every 3 years.

(3) Ensure that the scale is in an area that is draft-free (one that is not close to an open window, fan, etc.) and is well lighted.

(4) Avoid temperature extremes and sources of electromagnetic interference.

(5) Inspect power cord for wear.

e. Sealing. Seal electronic scales after testing and disabling calibrate functions. Seals should prohibit access to jumpers or adjustable components. Mechanical grain test scales do not normally require sealing, since misadjustment is more readily apparent.

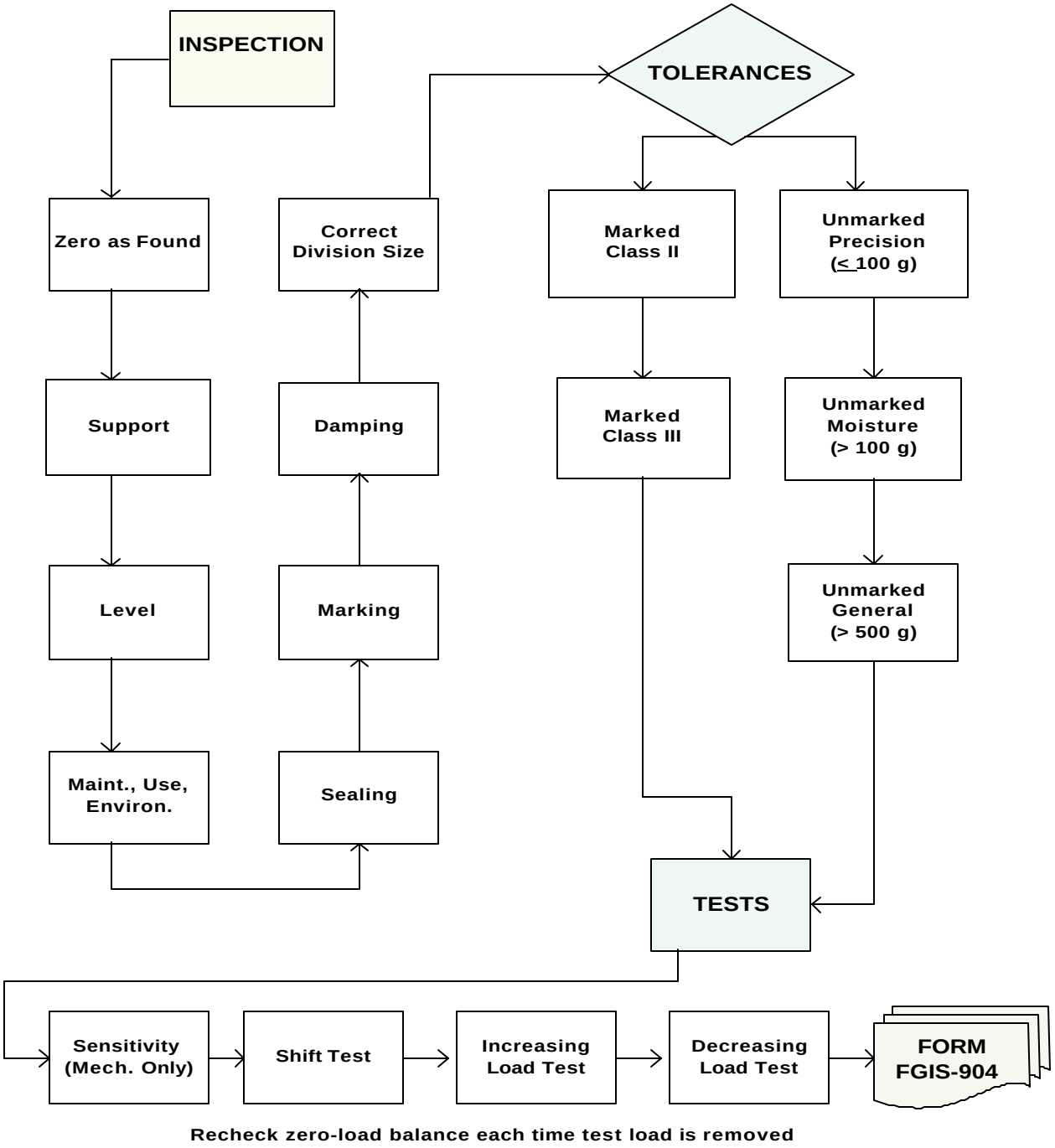


**Figure 1, Examination Procedure**

(1) Utilize either lead/wire seals or adhesive security seals (tamper-evident labels), such as form FGIS-931, Approved Label.

(2) Sealing provides assurance that untrained employees have not had access to jumpers or adjustable components.

(3) Unauthorized breaking of seals invalidates the most recent test and "Approved" status of a scale. It will need retesting and a new seal.

f. Marking. Scales should be marked with the manufacturer's name, model, serial number, class (if it is a marked scale), nominal capacity, value of a scale division (d), and value of the verification division (e) if different from d.

(1) When a scale is upgraded by a manufacturer, the manufacturer must revise the model number marking to correctly indicate the model change.

(2) Older, pre-1968 scales do not need to meet these marking requirements, but should have a serial number.

g. Damping. When applicable, check the dashpot for leakage and ensure that it is filled to the proper level.

h. Value of the Scale Divisions**.** The verification scale division (e) for grain-test scales shall not exceed 0.1 g for separations from loads through 500 g, and shall not exceed 1 g for separations from loads above 500 g through 1000 g. For scales used to weigh separations from loads of 100 g and less, d shall be less than or equal to 0.01 g, but may utilize expanded resolution.

**Table 1, Required Division Sizes**

| *Work Portion* | *Division Requirement* | *Accuracy Class* |
|---|---|---|
| *£ 100 g* | *e £ 0.1 g d £ 0.01 g* | *II (expanded resolution)* |
| *> 100 g* | *e £ 0.1 g d £ 0.1 g* | *II, III* |
| *> 500 g* | *e £ 1 g d £ 1 g* | *II, III* |

(1) The value "d" is the smallest division shown on the scale display.

(2) The value "e" is the verification scale division. It represents the stated accuracy of a scale when the scale display has extra units added in order to expand the resolution. The verification scale division (e) may be larger than the displayed scale division (d) for some devices.

(3) Some expanded resolution scales have cross-hatching over the least significant digit on the display. The last digit is ignored when testing the scale, but should be used when weighing grain work portions or separations.

i. Scales shall be NTEP or FGIS approved. The approval shall be for the operation mode (configuration) in which the scale is to be used.

j. Scales shall pass testing according to FGIS (and HB 44) tolerances.

k. Choosing an appropriate scale. A scale shall be appropriate for the service in which it is used, including but not limited to, capacity, value of the scale division, computing capability, etc. Electronic scales may be set up with multiple configurations, some of which may not be appropriate for official use. The division size shall be based on the work portion size, and both the work portion and the separation shall be weighed using a scale with the same (or better) maximum division size. For example:

(1) Weigh a work portion of 1,000 grams on a scale with $e \leq 1$ g $d \leq 1$ g. Weigh the separation on the same (or better) scale.

(2) Weigh a work portion of 125.0 grams on a scale with $e \leq 0.1$ g $d \leq 0.1$ g. Weigh the separation on the same (or better) scale.

(3) Weigh a work portion of 60.00 grams on a scale with $e \leq 0.1$ g $d \leq 0.01$ g (expanded resolution). Weigh the separation on the same (or better) scale.

(4) If you need assistance in determining if a scale is being used appropriately or that it is configured with the correct division size, consult the Approved Equipment List or the Policies and Procedures Branch.

## 3. MAINTENANCE TOLERANCES

After the pre-test inspection, determine the class or type of scale you are testing. If it is a marked scale, it is Class II or Class III, and shall be tested utilizing one of the following tables:

a. Tolerances for Scales Marked with an Accuracy Class.

### Table 2, Marked Scale Tolerances

| *Class II* | |
|---|---|
| *No. of Divisions* | *Tolerance in scale divisions* |
| *0-5,000* | *1* |
| *5,001-20,000* | *2* |
| *20,001 +* | *3* |

| *Class III* | |
|---|---|
| *No. of Divisions* | *Tolerance in scale divisions* |
| *0-500* | *1* |
| *501-2,000* | *2* |
| *2,001-4,000* | *3* |
| *4,001 +* | *5* |

(1) Sensitivity: Mechanical scales only, 1 d.

(2) Shift Error: Tolerance for the test load applied (above).

(3) Increasing Load: Tolerance for the test load applied (above).

(4) Decreasing Load Test: Tolerance for the test load applied (above).

The following table illustrates the same tolerance structure for marked scales in an alternate format that allows for easy determination of tolerances at each test load:

**Table 3, Marked Scale Tolerances, Alternate Table**

| | NIST Accuracy Class II | | | | | | | NIST Accuracy Class III | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Test Load (g) | Verification Division Size (grams) | | | | | | | | | | |
| | 0.01 | 0.02 | 0.05 | 0.1 | 0.2 | 0.5 | 1 | 0.1 | 0.2 | 0.5 | 1 |
| 1 | 1. Determine if the scale is Class II or Class III.<br>2. If the scale has expanded resolution tolerance is in "e" instead of "d." .<br>3. Read down from the division size and across from the test load to intersect at the correct tolerance to apply for each load. | | | | | | | 1d | | | |
| 2 | | | | | | | | | | | |
| 3 | | | | | | | | | | | |
| 4 | | | | | | | | | | | |
| 5 | | | | | | | | | | | |
| 6 | | | | | | | | | | | |
| 7 | | | | | | | | | | | |
| 8 | | | | | | | | | | | |
| 9 | | | | | | | | | | | |
| 10 | | | | 1d | | | | | | | |
| 20 | | | | | | | | | | | |
| 50 | | | | | | | | | | | |
| 100 | | | | | | | | | | | |
| 150 | | | | | | | | | | | |
| 200 | | | | | | | | | | | |
| 250 | | | | | | | | | | | |
| 300 | | | 2d | | | | | | 2d | | |
| 400 | | | | | | | | | | | |
| 500 | | | | | | | | | 3d | | |
| 600 | | | | | | | | | | | |
| 700 | 3d | | | | | | | | | | |
| 1000 | | | | | | | | 5d | | | |
| 1500 | | | | | | | | | | | |

b. Tolerances for Scales not Marked with an Accuracy Class.

If the scale being tested is an older, unmarked scale, it shall be tested for each type of use that it receives utilizing the following table:

## Table 4, Unmarked Scale Tolerances

| *Type* | *Use* | *Maximum d* | *Tolerance* | *Sensitivity (Mechanical Only)* | *Shift Test Tolerance* |
|---|---|---|---|---|---|
| *Precision* | *Work portions £ 100 g* | *0.01 g* | *0.02 g* | *0.01 g* | *0.02 g* |
| *Moisture* | *Work portions > 100 g OR moisture portions* | *0.1* | *0.2* | *0.1* | *0.2* |
| *General* | *Work portions > 500 g* | *1* | *1* | *1* | *1* |

## 4. TESTING

Test each scale when new (initial test), according to the testing schedule (periodic tests) and whenever the accuracy of the scale is in question, including after all repairs (supplemental tests). All testing must be performed with Class F weights that have a current Report of Test. Weights must be retested by FGIS or an approved State metrology laboratory every 3 years. Class P weights may be used by trained inspectors if they are handled with forceps and reserved for testing purposes only.

a. Zero Load Balance Change. All scales.

(1) Clean, level, and zero the scale with no load before testing begins.

(2) Monitor the no-load indication after removal of each test weight, during all subsequent testing.

(3) The scale should return to zero each time the load is removed. Tolerance is ±1 d.

b. Sensitivity Test. All mechanical scales. Sensitivity denotes the degree of responsiveness to a change in load. The zero-load sensitivity test determines the minimum amount of gently applied load which is required to produce a visual

change in the weight indication from zero balance. The sensitivity test should be repeated at the scale's maximum test load.

(1) Procedure for Testing Scales with Weight Loaders[2].

(a) Move the weight loader one (1) scale division.

(b) Gently release the balance arrest.

(c) If the indicator responds by moving at least one (l) scale division on the indicator scale, the scale is acceptable. If it does not move at least one (l) scale division, the scale is not acceptable.

(d) Arrest the balance and return the weight loader to "0."

(2) Procedures for Testing Scales without Weight Loaders.

(a) Gently place a load on the scale equal to one (l) scale division.

(b) If the indicator responds by moving at least one (l) scale division, the scale is acceptable. If it does not, the scale is not acceptable.

(c) Note: Moisture balances without weight loaders, such as Shadograph or Pennograph scales, must clearly show adequate indicator movement of approximately 1 mm when 0.1 g (100 mg) is applied. The optical indicator must be properly focused and a Class F weight must be used for the test.

c. Shift Test. All Scales. This test discloses the weighing performance of a scale under off-center loading conditions.

(1) Use a test weight equal to approximately ½the maximum test load applied during the increasing load test. Apply at a point midway between the center and the edge of each quadrant and observe the weight indication. Note, when testing even arm balances, shift test one pan, while keeping counterweights centered on the other.

[2] An internal scale mechanism that provides for the addition of counterbalance weights by means of a dial.

(2) If a deviation is noted in excess of the allowable error for any quadrant, the scale is not approved. See Section 3., Maintenance Tolerances, and apply the tolerance for the type of scale and weight used.

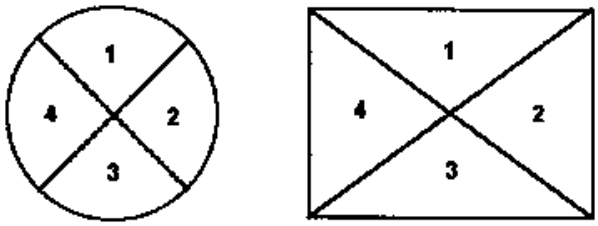


**Figure 2, Quadrants, Load Receiving Element**

d. Increasing-Load Test. This test determines the accuracy of a scale by comparing the value of applied weights to the weight indicated by the scale. A marked scale, for example Class II, is tested only as a Class II scale. It is not tested as a precision or moisture scale, even though it may be used that way. However, an unmarked scale is tested according to its use. If an unmarked scale is used for moisture and general weighing, it should be tested for both uses that the scale receives, as described on page 2-10.

(1) Procedures for Testing NIST Class II and III Scales.

(a) Test scales in these classes to capacity or 1,500 g, whichever is less. Scale owners may opt to test above 1,500 g to capacity, if weights are available.

(b) Place a test load equal to 1 g on the scale and note the weight indication. Continue testing at the following levels as appropriate: 2 g, 3 g, 4 g, 5 g, 6 g, 7 g, 8 g, 9 g, 10 g, 20 g, 50 g, 100 g, 150 g, 200 g, 250 g, 300 g, 400 g, 500 g, 600 g, 700 g, 1,000 g, and 1,500 g.

(c) If a deviation is noted in excess of the established tolerance, the scale is not approved.

(2) Procedures for Testing Unmarked Precision Scales.

(a) Test these scales to capacity or 100 g, whichever is less. Scale owners may opt to test above 100 g to capacity, if weights are available.

(b) Place the l g test load on the scale and note the weight indication. Continue at the 2 g, 3 g, 4 g, 5 g, 6 g, 7 g, 8 g, 9 g, 10 g, 20 g, 50 g, and 100 g test load levels.

(c) If a deviation is noted in excess of ± 0.02 gram, the scale is not approved.

(3) Procedures for Testing Unmarked Moisture Scales.

(a) Test these scales to capacity or 500 g, whichever is less. Scale owners may opt to test above 500 g to capacity, if weights are available.

(b) Place the l g test load on the scale and note the weight indication. Continue at the 2 g, 3 g, 4 g, 5 g, 6 g, 7 g, 8 g, 9 g, 10 g, 20 g, 50 g, 100 g, 150 g, 200 g, 250 g, 300 g, 400 g and 500 g test load levels.

(c) If the deviation is noted in excess of ± 0.2 gram, the scale is not approved.

(d) For Shadograph type balances with no graduations on the indicator, when an error is observed, place 0.2 g (200 mg) of error weights, applied to the lighter side of the scale (to cancel out the error). If the indicator responds by moving back to the center mark or across the center mark, then the previously observed error is known to be less than or equal to 0.2 g. The indication can be estimated and recorded on test forms.

(4) Procedures for Testing Unmarked General Scales.

(a) Test these scales to capacity or 1,500 g, whichever is less. Scale owners may opt to test above 1,500 g to capacity, if weights are available.

(b) Place the l g test load on the scale and note the weight indication. Continue at the 2 g, 3 g, 4 g, 5 g, 6 g, 7 g, 8 g, 9 g, 10 g, 20 g, 50 g, 100 g, 150 g, 200 g, 250 g, 300 g, 400 g, 500 g, 600 g, 700 g, 1,000 g, and 1,500 g test load levels.

(c) If a deviation is noted in excess of ± l gram, the scale is not approved.

e. Decreasing Load Test. All electronic scales. Test unmarked electronic scales immediately following the maximum applied test load of the increasing load test, at approximately ½ the maximum test load applied during the increasing load test. For Class II or Class III scales test at 400 g, 200 g, and 50 g.

f. Discrimination Test. Field locations are not required to perform the discrimination test on electronic grain test (laboratory) scales.

g. Test Record.

(1) Upon completion of each phase of testing, record the results on a form FGIS-904, Laboratory Scale Test.

(2) In the case of out-of-tolerance equipment, document on the form all pertinent facts and actions (including adjustments, retests, and follow-up action).

(3) After all tests are completed and the results recorded, file the original form FGIS-904. Agencies and FGIS field offices do not need to submit copies to the field office or FGIS Headquarters, unless specifically requested.

(4) At the conclusion of scheduled testing, agencies must request in writing from the local field office, the issuance of form FGIS-931, Approved Label, by scale serial number for each scale that meets the requirements of this chapter. (As an alternative to the written request, they may continue the old procedure of submitting copies of the form FGIS-904, if this is agreed to by both the agency and field office.)

(5) The field office shall fill out and issue one label per scale. If security sealing is needed the additional labels should be marked “Security Seal - mm/dd/yy” and provided to the scale owner.

# FORM FGIS-904 LABORATORY SCALE TEST

3

## Laboratory Scale Test

U.S. Department of Agriculture
Grain Inspection, Packers, & Stockyards Administration

*Before proceeding with this test, review Chapter 2 of the Equipment Handbook. Clean, level, and balance the scale, before starting. Any test weights needed to determine accuracy must have a current Report of Test to Class F tolerances.*



| Date 1 | Field Office 2 | Agency 3 | Location 4 |
|---|---|---|---|
| Scale make, model, and serial No.: 5 | | Capacity x division size (d): 6 | |

***Check mark the Class or Type of use, not both.*** *A marked scale has a roman numeral II or III on the front or the i.d. plate. An unmarked scale is tested using either Class II or Class III tolerances, regardless of what it is used for.*

7 Class II ☐

| Class II | |
|---|---|
| No. of Div. | Tol. |
| 0-5,000 | 1d |
| 5,001-20,000 | 2d |
| 20,001 + | 3d |

| Class III | |
|---|---|
| No. of Div. | Tol. |
| 0-500 | 1d |
| 501-2,000 | 2d |
| 2,001-4,000 | 3d |
| 4,001 + | 5d |

Class III ☐ 7

*An unmarked scale is tested according to each type of its uses: Precision (and separations from work portions ≤ 100 g), Moisture (and separations from work portions > 100 g), and General (and separations from work portions > 500 g).*

8 Type

| Type | d | Test Loads Required | Tol. |
|---|---|---|---|
| ☐ Precision, etc. | 0.01 g | 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 20, 50, 100 g | 0.02 g |
| ☐ Moisture, etc. | 0.1 | above plus 150, 200, 250, 300, 400 g | 0.2 |
| ☐ General, etc. | 1 | above plus 500, 600, 700, 1000, 1500 g | 1 |

**1. Class F weights** used in this exam were last tested on this date (maximum 3 years) _____.

**2. Zero balance** the scale before the sensitivity test, shift test and increasing load test.

**3. Sensitivity** Mechanical scales only. At zero, add weight equal to one scale division. The scale indicator should move to the top of the trig loop (or readings should change by at least one division). Repeat the test at the scale's maximum test load.

**4. Shift Test** Place weight of approx. 1/2 of the maximum test load (applied during the increasing load test) halfway between the center and the edge of each quadrant. Apply the basic tolerance for the type of scale and test load.

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| | Quadrant 1 | | Quadrant 2 | | Quadrant 3 | | Quadrant 4 |
|---|---|---|---|---|---|---|---|
| Reading | | | | | | | |

**5. Increasing Load** For *marked* scales, test at each load from 1g to 1500g (or max. capacity) as as indicated below. For *unmarked* scales test at each load indicated above, for each of the scale's uses. Evaluate the scale according to the tolerances shown above, for the type scale tested.

| Test Load | Indication | Test Load | Indication | Test Load | Indication | Test Load | Indication |
|---|---|---|---|---|---|---|---|
| 1g | | 7g | | 100g | | 500 | |
| 2 | | 8 | | 150 | | 600 | |
| 3 | | 9 | | 200 | | 700 | |
| 4 | | 10 | | 250 | | 1000 | |
| 5 | | 20 | | 300 | | 1500 | |
| 6 | | 50 | | 400g | | | |

10

**6. Decreasing Load** - Perform this test while removing weights from the increasing load test.

| Test Load | Indication |
|---|---|
| 400 | |
| 200 | |
| 50 | |

11

**7. Balance Change.** Record the maximum no-load indication during the above tests. Tolerance is 1d.

| Test Load | Indication |
|---|---|
| 0 | |

12

Approved _____ 13 Disapproved _____ Tested By: 14

FORM FGIS-904 (1-02) (Previous editions are obsolete.)

INSTRUCTIONS FOR COMPLETING FORM FGIS-904,
"LABORATORY SCALE TEST"

1. Date the test was performed.

2. Field office that performed or supervised the performance of the test.

3. Agency that performed the test, when applicable.

4. Location of the field office or agency that performed the test.

5. Name of the manufacturer, model number, and scale serial number.

6. Maximum rated scale capacity and the minimum scale division size.

7. Indicate with a check mark if the scale is marked with an accuracy class, such as Class II.

8. Indicate with one or more check marks the application of the unmarked scale; precision, moisture, or general.

9. Record scale indications from the shift test.

10. Increasing Load Test - Test marked scales at each test load indicated up to 1,500 g or capacity, whichever is less. Test unmarked scales at each test load shown in the table checked off in item 8, above.

11. Decreasing Load Test - Test marked scales at each load indicated, as appropriate. Test unmarked scales at approximately ½ the maximum test load used in the increasing load test. If the scale is mechanical, do not perform the test or complete this portion.

12. Balance Change - Scale indication with zero load at completion of testing must be ≤ 1 division.

13. Has the scale met all requirements of the pre-test inspection as well as each (all) of the accuracy tests?

14. Name of the person who performed this test.

FAX Number (202) 720-1015
GIPSA, Field Management Division
Return Form To: Retain in official file.
Any Questions Call: Local GIPSA field Office.

## 5. MODEL INFORMATION

a. Toledo.

(1) Toledo Computagram Models 3700, 3710, 3780, 4030, 4031, and 4032 are mechanical scales that employ knife-edge pivots and bearings throughout, with a fan-type indicator counterbalanced by an internal pendulum weight. The scales' chart capacity is 500 x 1 gram. However, with the use of counterbalance weights, the capacity can be increased to 5,000 grams.

(2) Classification. General weighing, and weighing separations from work portions larger than 500 grams.

(3) Dashpot. The purpose of the dashpot is to reduce indicator oscillation and to absorb the shocks from sudden load impacts. The dashpot is accessible through an opening on the underside of the scale. Slide the scale partially off the tabletop to reach the dashpot. Due to the type of weighings made with the Toledo scale, it is seldom necessary to add oil to the dashpot. If oil is needed, it should be ordered from the manufacturer or dealer. The dashpot can be unscrewed to add oil.

(a) Dashpot Check. A 250-gram test weight or grain sample is required for checking the dashpot adjustment. The adjustment is checked by placing the 250-gram load into the scoop and noting the number of swings the indicator makes before it stops. If the dashpot is properly adjusted, the indicator should make three or four passes over the 250-gram mark before coming to rest. Each successive swing will be materially reduced (e.g., first swing -- plus 25 grams, second swing -- minus 10 grams, third swing -- 3 grams, fourth swing -- stop.)

(b) Dashpot Adjustment. The dashpot adjustment screw is located inside the balance case under the counterbalance weight platter. It is accessible through a small plate. Turning the dashpot adjustment screw counterclockwise dampens or decreases the indicator swing. Turning it clockwise increases the indicator swing. A slight movement of the screw in either direction has considerable effect on the extent of the swing. The dashpot setting is closely related to the sensitivity of the scale. Therefore, whenever the dashpot has been adjusted, check the sensitivity of the scale to determine that it has not been affected.

b. Torsion Balance Models 5055, SE-1, DLT 2-1, DWL 2-1, DLM 2-1, DWM 2-1, Drx2, and Rx-1.

(1) These scales are equal-arm balances, which utilize metal torsion bands.

(2) Classification. Precision weighing, and weighing separations from work portions less than or equal to100 grams.

(3) Hydraulic and Magnetic Dashpots. All torsion balances with the exception of models 5055 and SE-l are equipped with dashpots. The purpose of the dashpot is to dampen indicator oscillation. Hydraulic dashpots are filled with a silicone fluid. Do not use oils or other fluids. Silicone fluid may be obtained from the manufacturer or dealer.

Hydraulic Dashpot Adjustment. These balances are designed to operate with the dashpot fully open. The dashpot control is located on the underside of the balance case to the right of the balance arrest control. Turning the control counterclockwise opens the dashpot. Dashpots shall be filled to a level not exceeding three-eighths of an inch from the top. Dashpots shall be closed when balances are inverted or moved from location to location.

(4) Mechanical Weight Loaders. Some models are equipped with a weight-loading mechanism, which partially eliminates the need for loose weights. Rough manipulation of the weight-loader control can displace the weights from the weight loader. An access plate on the left side of the balance case is removed for replacing weights on the weight loader. The weight order is 1-4-2-2 left to right. When the weight-loader control is placed in the "9" position, the weights are locked and cannot be displaced from the weight loader.

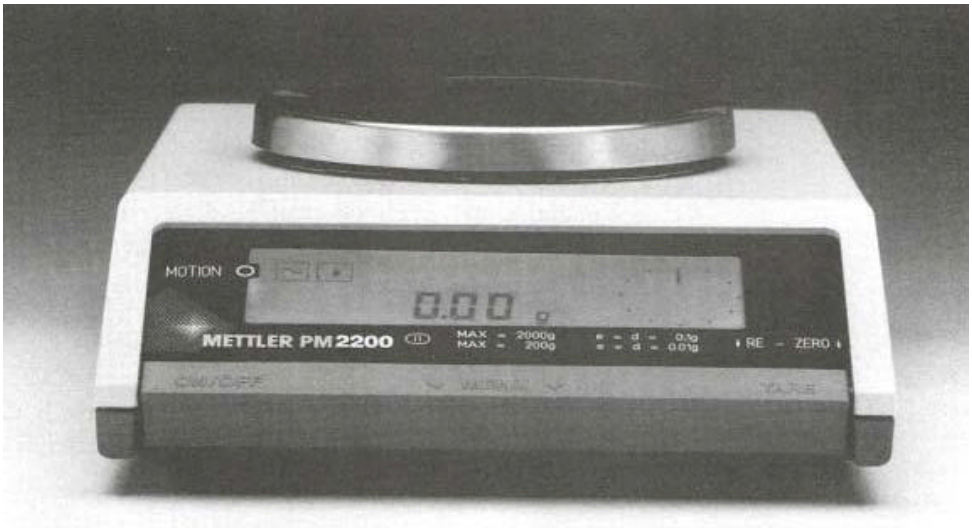
c. Mettler PM 2200-1/49.

(1) The Mettler PM 2200-1/49 is an electronic grain test scale that provides functions such as: weighing in grams, percentage, and test weight per bushel. The scale has a range of 0.00 g to 200.00 g x 0.01 g and 200.0 g to 2100.0 g x 0.1 g.

(2) Classification. Precision, Moisture, and General.

(3) Calibration. The accuracy of this scale requires that it is calibrated at the location where it is to be used. This will ensure that differences in temperature, pressure, and gravity do not put the scale out of tolerance.

To calibrate this scale you need a 2,000-gram weight that is accurate to +/- 30 mg. A Class F 2,000-g weight has an allowable tolerance of +/- 200 mg, but often they are adjusted closer to zero and, therefore, may be acceptable for calibration use. Only trained equipment specialists should attempt to calibrate the scale. If you are not able to calibrate successfully, contact a scale service representative. After calibration and testing are completed, the calibrate function must be disabled and the scale must be sealed to prevent unauthorized access.




(a) Allow a warm-up time of at least 60 minutes before calibration. Be sure to level the balance properly.

(b) Follow manufacturer's instructions for the calibration procedure.

(c) Test the scale following procedures in this chapter.

(d) Disable access to the calibration mode:

1) Disconnect power cord. Remove pan, pan support, and cover.

2) Remove the locking screw and pull out the cassette drawer.

3) Remove the jumper plug from the cassette through the access hole, using a pin to lever the jumper plug straight out of the access hole. Reposition the jumper plug so it bridges the two pin contacts, preventing access to the calibrate mode. Insert

the cassette drawer and position the locking screw so the drawer cannot be removed.

(e) Reassemble the balance. Reconnect power and switch the balance on. Verify that the calibrate routine is no longer available. Apply a seal to the cover.

(f) If recalibration is needed in the future, disconnect the power cord and disassemble the balance. Remove or reposition the jumper plug to gain access to the calibration mode. Then perform steps (a) through (e) above.

d. Seedburo Computer Scale, Models 8840, 8850, and 8860.

(1) These are electronic scales, which can also convert gram weights to test weight per bushel.

(2) Classification. Models 8840 and 8860 - General weighing, and weighing separations from work portions larger than 500 grams.

(3) Model 8850 - Moisture and General weighing, and weighing separations from work portions larger than 100 grams.